HELLENiQ UPSTREAM
IONIO

# BLOCK IONIAN

# LEASE AREA

# ENVIRONMENTAL REPORT 2024 - 2025

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# BLOCK IONIAN LEASE AGREEMENT AREA

# ENVIRONMENTAL REPORT 2024

## HSE Policies & System, Environmental Studies and Implementation

## *1. Introduction*

HELLENiQ UPSTREAM IONIAN Single Member S.A. (HELLENiQ UPSTREAM IONIAN), 100% subsidiary of HELLENiQ UPSTREAM S.A., owns all the rights to explore and produce hydrocarbons deriving from the Lease Agreement with the Greek State in the offshore area of Ionian Sea (Block Ionian), total area 3.420,6 sq. km. HELLENiQ UPSTREAM IONIAN S.A. (100%, Operator) officially signed the Lease Agreement with the Minister of Environment & Energy on April 9, 2019 and on October 10, 2019, the Greek Parliament ratified (Law 4630/10.10.2019). HELLENiQ UPSTREAM IONIAN, acting as Operator, is fulfilling its commitments and planning of the first phase of the exploration work program by implementing the most up-to-date, safe and environmentally friendly technological methods and practices with the outmost respect to local societies and socioeconomic activities. According to the Provisions of Article 12 for «Environmental Protection» «The Lessee shall include in each Annual Work Program and Budget to be submitted to the Lessor, an environmental report on the work to be undertaken as provided in that document, as well as on the work undertaken in accordance with the preceding Annual Work Program and Budget».

## *2. Environmental Monitoring and Recording of Critical Biodiversity Indicators 2024final results*

In the context of Environmental Monitoring and Recording of Critical Environmental Indicators of Biodiversity, such as marine mammals (cetaceans and monk seals), sea turtles and seabirds, the HELLENiQ UPSTREAM IOANIAN Single Member Société Anonyme (HELLENiQ UPSTREAM IONIAN S.A.) company has assigned to Nature Conservation Consultants (NCC) Ltd a contract for conducting the present Project, namely the "Survey of the Status of Important Fauna Species in the Block Ionian Lease area".

The project presents the field surveys carried out during 2024 and the results in each Work Package of the project "Survey of the Status of Important Fauna Species in the Ionian Block Lease area". The present project is the 2024 continuation of the ongoing project "Survey of the Status of Important Fauna Species in the Ionian Block Lease area", which started in 2022.

The Project consists of four (4) Work Packages:

**WP I: Pelagic boat surveys for marine mammals, seabirds, sea turtles, nearshore and in the open sea**, using large sailing and open water RIB vessels.

**WP II: Aerial surveys for marine mammals, seabirds, sea turtles, nearshore and in the open sea,** using a light aircraft.

**WP III: Coastal surveys for monk seals, Scopoli's shearwater and Mediterranean shag breeding sites in the coastal zones of the adjacent Natura 2000 sites,** using open water RIB vessels.

**WP IV: Telemetry for seabirds and marine mammals at Diapontia islets SPA and the surrounding project area,** using drone videography and stationary thermal cameras, in combination with Artificial Intelligence and Machine Learning algorithms.

**Description of the Project Area**

The **Project Area** is located in the North Ionian Sea, west-southwest of Corfu and Paxoi Islands and west of Lefkada Island, approximately from the latitude town Palaiokastritsa in Corfu in the north and the southern tip of Lefkada Island in the south. It extends between latitudes of 38º34'N in the south and 39º40'N in the north and between latitudes of 19º25'E in the west and 20º37'E in the east. Its total surface area is 6,668 km2 (Figure 1).

The **Wider Project Area** envelops the project area and extends further north and east to additionally include the Diapontia Islands, the west coast of Corfu, Paxoi and Antipaxoi and the west coast of Lefkada Island. The Wider Project Area includes three Natura 2000 sites: SPA GR2230008 Diapontia Nisia, SCI GR2230010 marine area Diapontion Nison and SCI GR2230004 Nisoi Paxoi wider marine area. (Figure 2).The sea depth within the Project Area ranges from 250m in the coastal areas to more than 2,000m at its southern part.

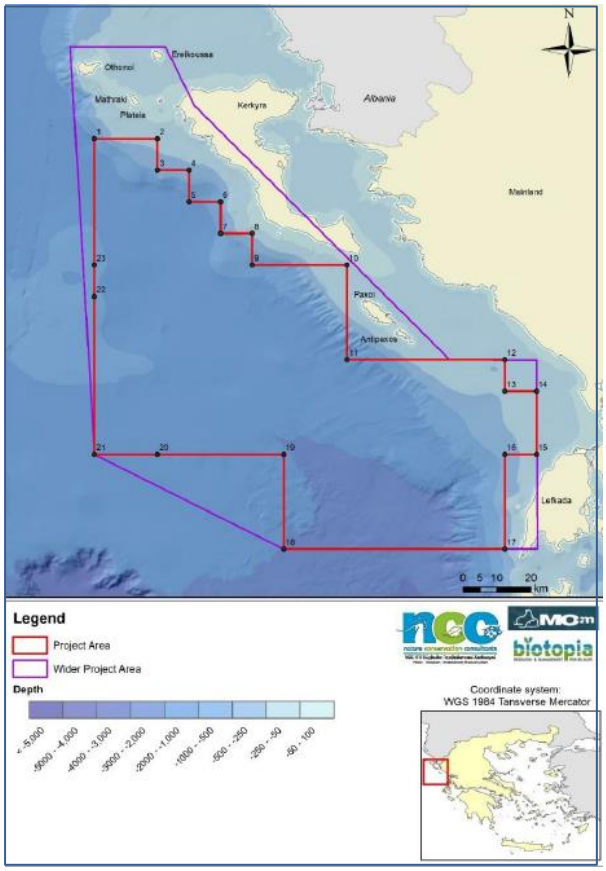


Figure 1: Project Area and Wider Project Area

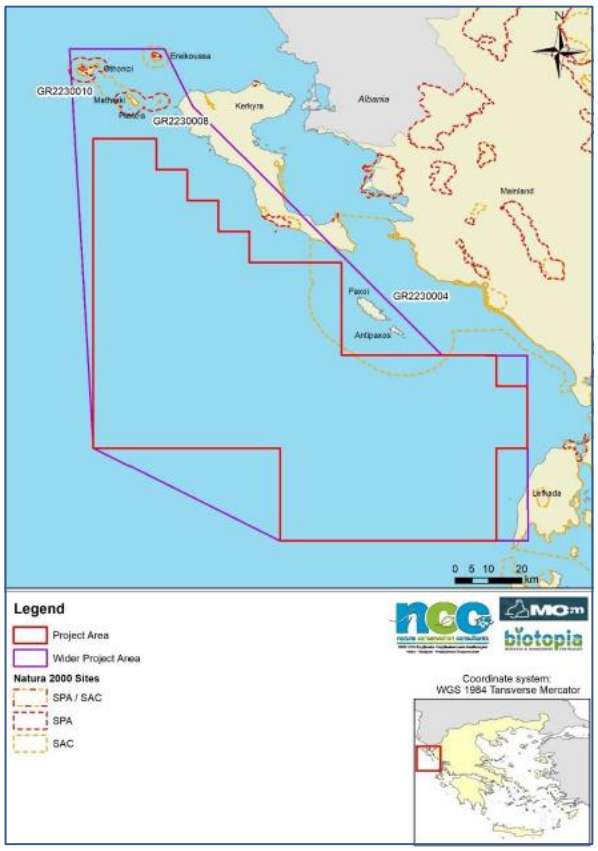


Figure 2: Natura 2000 sites in the wider area of the "Ionian block"

**WP I: Pelagic boat surveys for marine mammals, seabirds, sea turtles, nearshore and in the open sea**, using large sailing and open water RIB vessels.

• A total of **149 nautical miles** of boat-based visual surveys and cetacean surveys were carried out on 15-16/4/2024 in the southern, eastern, northern and central part of the Pelagic Survey Area, as well as in the surrounding areas in the Wider Project Area, to assess the presence, abundance and distribution of the cetacean, sea turtle and seabird species of interest.
During the **acoustic surveys with the towed hydrophone**, covering 528 nautical miles, **3 sperm whales** were detected, as well as **67 dolphin individuals** (species identification is not possible with the towed hydrophone survey) in the Wider Project Area.

Figure 3: Sperm whales during the boat surveys

**WP II: Aerial surveys for marine mammals, seabirds, sea turtles, nearshore and in the open sea,** using a light aircraft.

• The aerial surveys were conducted on the 6th and the 28th of April 2024. A total of **622 km** were inspected thoroughly, covering part of the Pelagic Project Area. During the aerial surveys no cetaceans were recorded in the Project Area and the Wider Project Area.

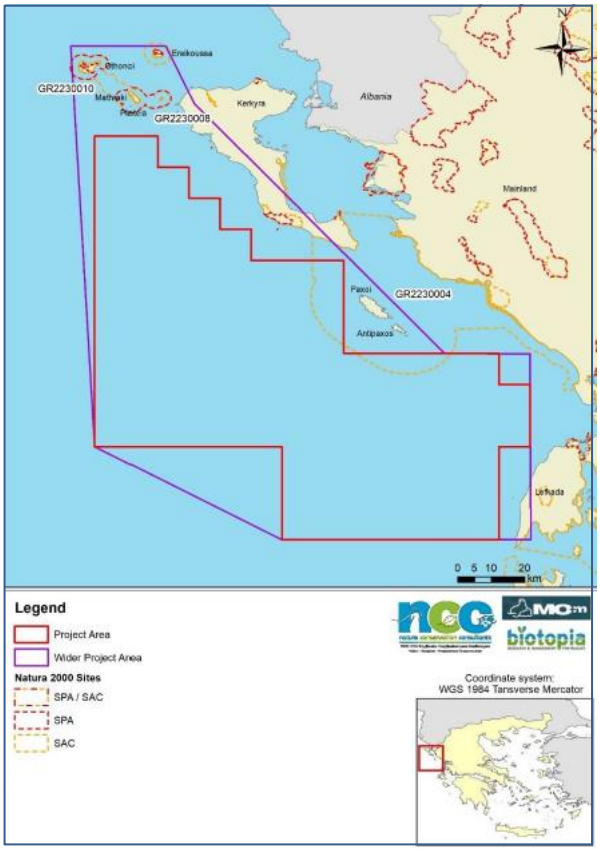


Figure 4: Aerial surveys tracks.

**WP III: Coastal surveys for monk seals, Scopoli's shearwater and Mediterranean shag breeding sites in the coastal zones of the adjacent Natura 2000 sites,** using open water RIB vessels.

During June 2024 MOm's field expert team completed the mapping of important for the species terrestrial habitat (suitable for resting and/or pupping marine caves-figure 6). The experts considered it important to include the northern coasts of Kefalonia in the coastal research as: a) there are important sites used by the species b) although a little outside the study area, this part of Kefalonia can be also affected by future oil extractions in the event of an accident and an oil spill. A total of 24 shelters (marine caves) were recorded in the study area (including the northern coasts of Kefalonia) suitable for use by animals, of which 8 also suitable for breeding. In addition, 13 monk seal observation were collected through the operation of the RINT in the area, of which one was an observation of a newborn pup at Northern Kefalonia confirming the importance of this area for the species.

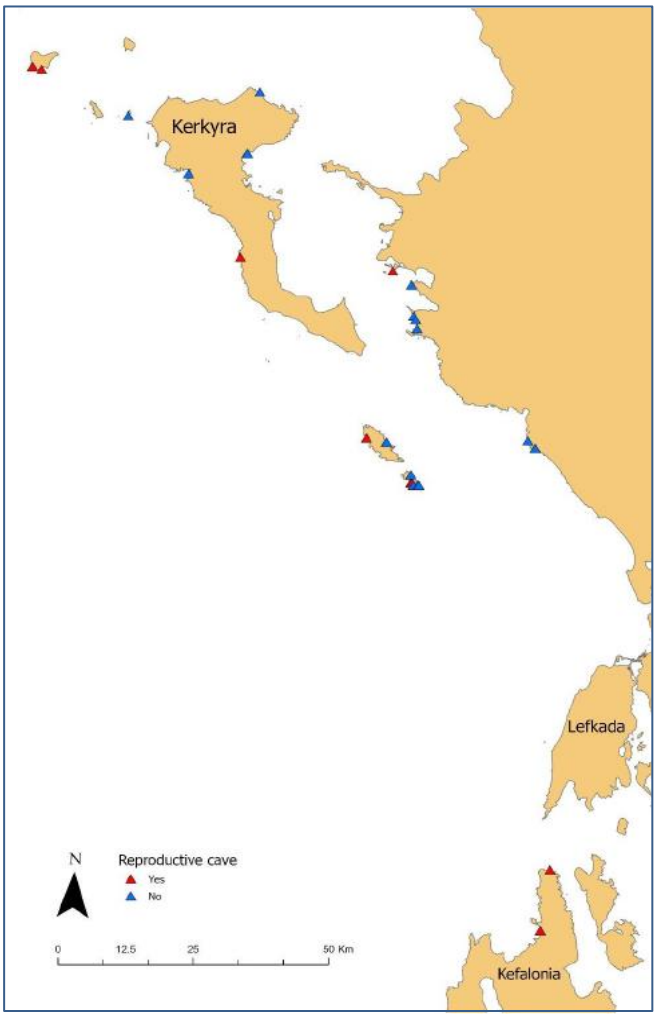


Figure 5: Distribution of suitable for the monk seals marine caves

Coastal surveys for Scopoli's shearwater were conducted in July 2024 using a RIB boat. The coastal surveys focused on Tracheia islet at the Diapontia islands complex, where a breeding colony of Scopoli's Shearwater is located (one of the two known colonies of the species in Ionian Sea; the other one is located on Strofades Islands). A concentration at sea (raft) of 400-500 individuals was spotted during dusk, while a number of accessible nests on Tracheia islet was spotted in order to trap breeding birds for tagging.

Coastal surveys for the Mediterranean Shag were conducted in July and October 2024. 8 individuals were observed in the area of Paxoi-Antipaxoi islands, in the vicinity of the breeding colonies of the species.

**WP IV: Telemetry for seabirds and marine mammals at Diapontia islets SPA and the surrounding project area,** using drone videography and stationary thermal cameras, in combination with Artificial Intelligence and Machine Learning algorithms.

The movements and flight patterns of Scopoli's Shearwater were monitored by telemetry. The birds were tagged at the breeding colony of the species on Tracheia

islet. The results revealed that the tagged birds use the area if North Ionian – South Adriatic Sea for foraging during their breeding season. At the beginning of October, they start visiting the Gulf of Taranto and gradually by the end of October they start migrating towards their wintering grounds in Atlantic.

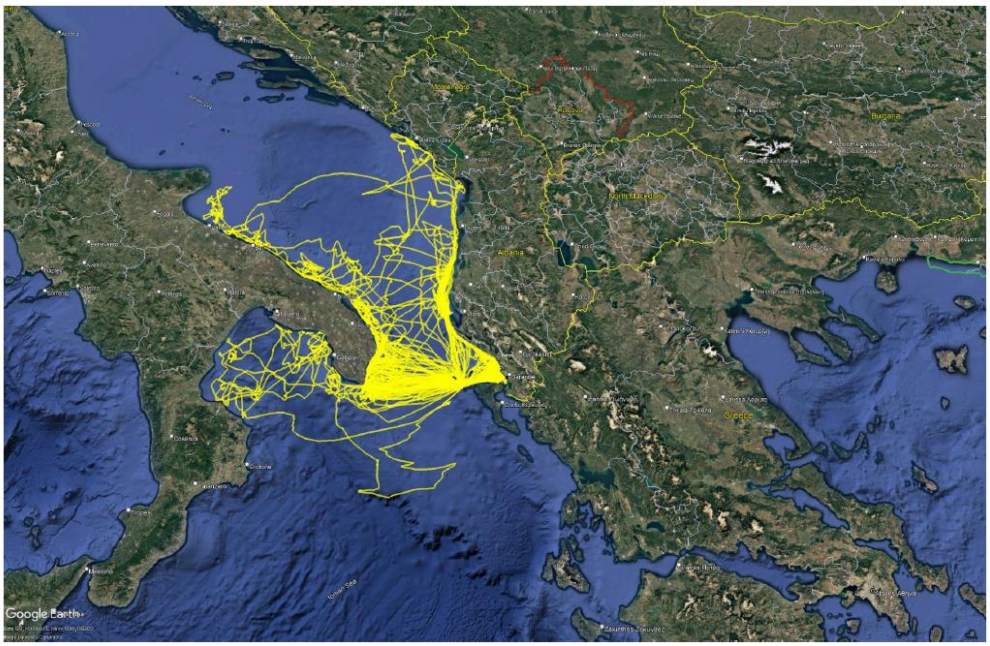


Figure 6: Flight movements of the tagged Scopoli's Shearwaters.

More details regarding the Final Report on the field surveys carried out during 2024 and the results in each Work Package of the project could be found in the website of the Environmental Unit of HELPE IONIAN:

https://helpe-ionian.gr/en/environment/critical-habitats-biodiversity.html

### *2.1. 2024 Monitoring period – Results*

During 2024, all the scheduled tasks have been performed successfully:

- Both boat surveys (visual-based and acoustic) and aerial surveys were carried out in the project area in spring, summer and autumn 2024. In total 4 species of cetaceans (sperm whale, Cuvier's beaked whale, striped dolphin and bottlenose dolphin) were spotted. The most numerous species was the striped dolphin with a group of 34 individuals in October's survey, but the most important observation was a family group of 4 sperm whales, which were detected in the deep-water SW of Paxoi Island. It is worth mentioning that this year a dedicated effort to locate sperm whales was carried out under the guidance of Dr. Jonathan Gordon, an international expert of the species, who supported the overall fieldwork project planning this year and participated in the surveys in July.

- Additionally, 8 species of seabirds and one species of sea turtle were recorded during the surveys. Scopoli's Shearwater was the most abundant seabird species, as it holds two large breeding colonies in the Ionian Sea (Strofades islands and Diapontia islands) and regularly uses the Project Area as a foraging ground. Moreover, during the boat survey in April, a number of migratory passerines were recorded, with some individuals using the sailing boat as a resting spot in the open sea during their spring migration.

- The mapping of the terrestrial habitat of Mediterranean monk seal was completed and the important pupping sites were identified. The distribution of the breeding areas should be considered when planning the future monitoring scheme of the species in the wider study area, as well as for taking protective measures related to the future realization of oil/ natural gas extractions as well as the possibility of an accident and an oil spill.

- Telemetry of Scopoli's Shearwater revealed that the tagged birds used the wider area of North Ionian – South Adriatic Sea as foraging grounds during their breeding period. In October they started moving westwards and by the end of the month began their autumn migration towards the Atlantic.

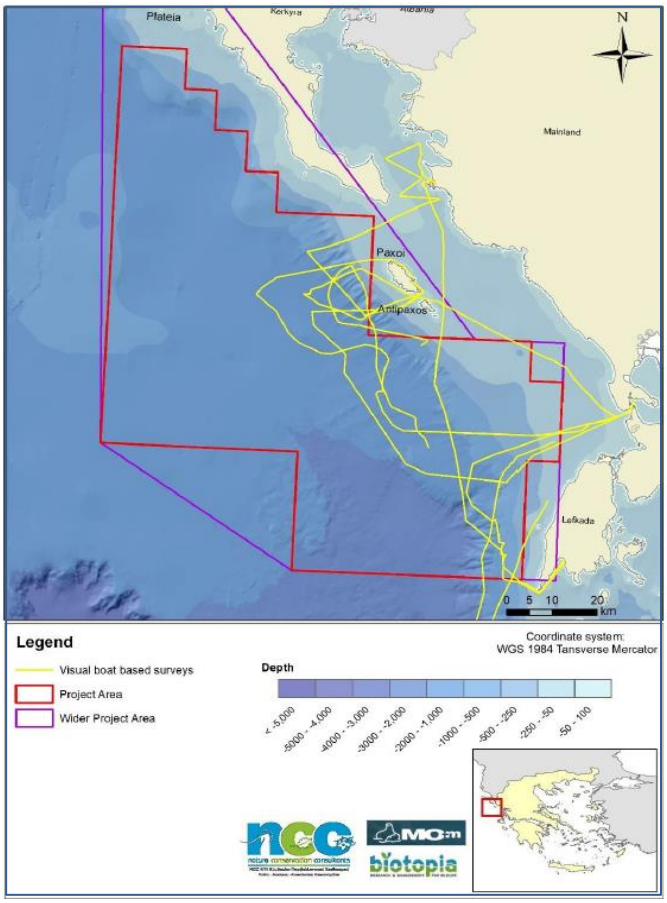


Figure 7:Visual boat-based survey tracks

Figure 8: Bottlenose dolphins (above) and stripped dolphins (below) during the boat surveys

# 3. Seismicity Monitoring 2024 results and 2025 onwards

## 3.1. Introduction

HELLENiQ UPSTREAM Ionian S.A. continued during 2023 the Seismicity Monitoring of the Block Ionian lease area in collaboration with the Geodynamic Institute of the National Observatory of Athens (CONTRACT AGREEMENT 2022014/06.05.2022), in order to monitor the existing seismic activity in real time. To this end, a local network and a local seismic array were installed in 2022. The National Observatory of Athens (NOA), headed by its President, Prof. Emmanouel Plionis, and the Principal Investigator Dr. George Drakatos (Emmer. Researcher IG/NOA) undertook the installation of a local

network consisting of twelve (12) portable seismographs, as well as a local seismic array.

The aforementioned took place for the purpose of increasing the density of the already existing national seismograph network, used by the Institute of Geodynamics of NOA for the continuous monitoring of the daily seismic activity of the Greek area. In addition to the already existing stations that are operated by the National Seismographic Network, twelve (12) new stations were installed that are in continuous operation with real-time data transmission to the Institute of Geodynamics.

The placement of the stations was done in such a way as to achieve the maximum density of the network utilising, where possible, every island in the area. Because the survey area was offshore, towards the Ionian, it was quite difficult to have a sufficiently adequate azimuthal coverage. Therefore, in order to better cover the area, a seismic array was installed on the island of Ithaca and a nearby station on the Italian coast was also used in the analysis.

The coordinates of the local network positions are described in the table 1 below:

Table 1 The new stations installed by the IG-NOA around the Ionian

| No | Code name | Location | Latitude (N) | Longitude (E) |
|---|---|---|---|---|
| 1 | OTHN (ION 1) | Othoni Isl. | 39.84 | 19.41 |
| 2 | ALTS (ION 2) | Avliotes, Corfu | 39.78 | 19.67 |
| 3 | PLKS (ION 3) | Pelekas, Corfu | 39.59 | 19.82 |
| 4 | VRAG (ION 4) | Vragkaniotika, Corfu | 39.47 | 19.91 |
| 5 | KAVS (ION 5) | Kavos, Corfu | 39.39 | 20.11 |
| 6 | PAXO (ION 6) | Paxoi | 39.19 | 20.18 |
| 7 | AGKR (ION 7) | Ag. Kyriakoi, Parga | 39.28 | 20.45 |
| 8 | LYGI (ION 8) | Lygia, Preveza | 39.15 | 20.57 |
| 9 | MTKS (ION 9) | Mytikas, Preveza | 39.00 | 20.71 |
| 10 | IRAS (ION 10) | Ag. Nikolaos of Ira Monastery, Lefkas | 38.59 | 20.56 |
| 11 | ATHR (ION 11) | Atheras, Cephalonia | 38.30 | 20.41 |
| 12 | KMNR (ION 12) | Kaminarata, Cephalonia | 38.22 | 20.38 |

### *3.2. Geological background of the local network installation*

The broader North Ionian Sea region is located on the External Hellenides, which are divided to the following geotectonic zones (from east to west): Pindos, Gavrovo-Tripolis, Ionian and Paxoi-Kastelorizo (or else Apulia/Preapulia):

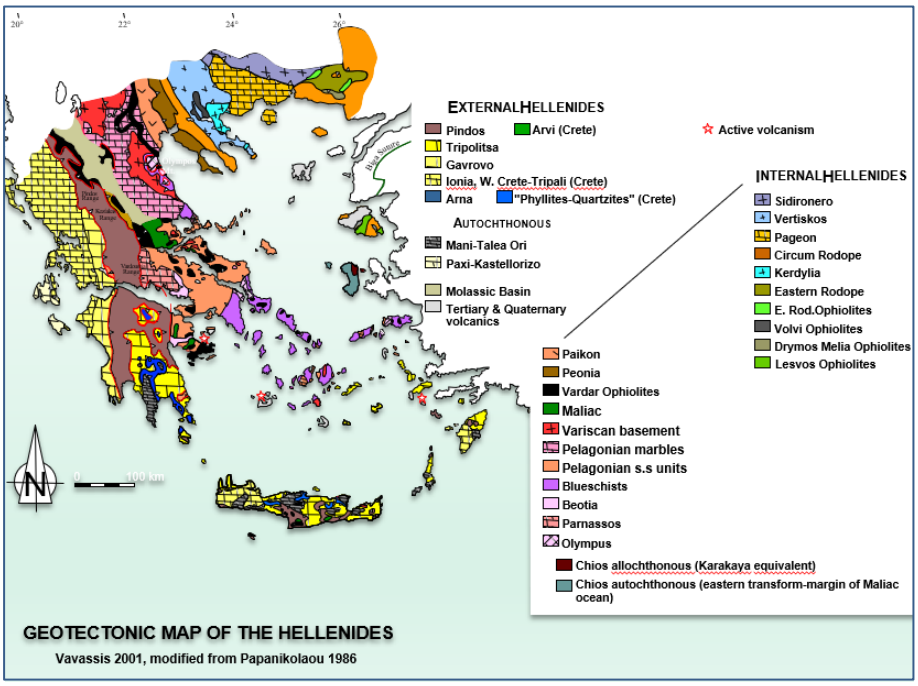


Figure 9: Geotectonic Map of the Hellenides (Vavassis 2001)


Figure 10: Geological map (IGME, 1983) of the portable (purple triangles) and permanent – HUSN (green triangles) seismographic station locations. The hatched yellow polygon represents the study area.

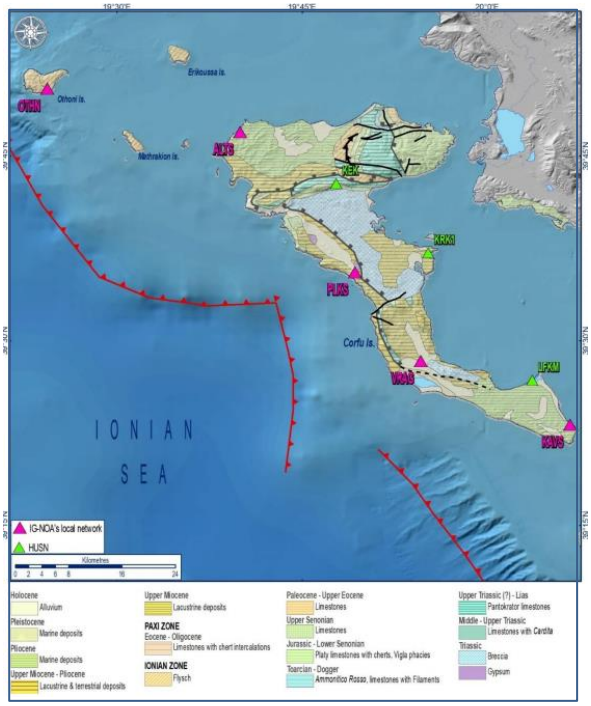


Figure 11: Geological map (IGME, 1983) of the portable (purple triangles) and permanent – HUSN (green triangles) seismographic station locations. The hatched yellow polygon represents the study area.

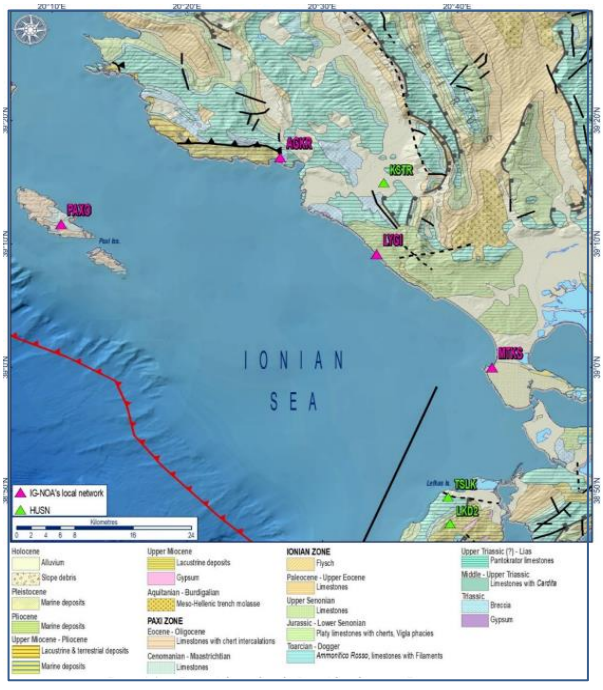


Figure 12: Geological map (IGME, 1983) of the portable (purple triangles) and permanent – HUSN (green triangles) seismographic station locations. The hatched yellow polygon represents the study area.

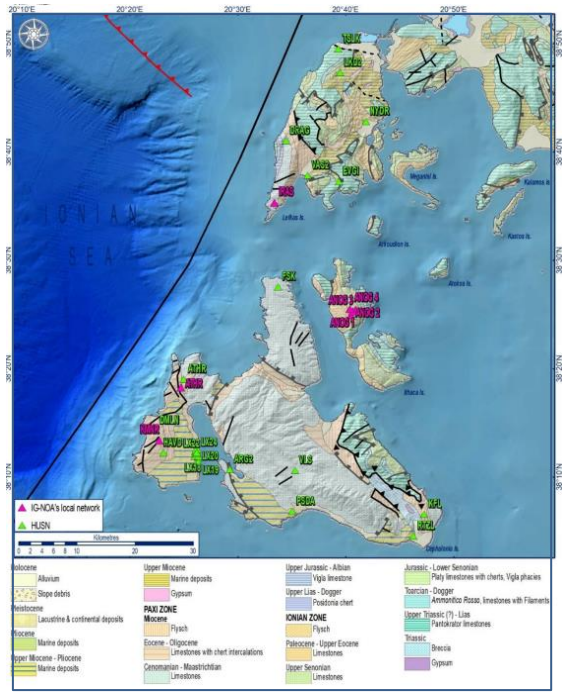


Figure 13: Geological map (IGME, 1983) of the portable (purple triangles) and permanent – HUSN (green triangles) seismographic station locations. The hatched yellow polygon represents the study area.

### *3.3. Data analysis*

For the acquisition, analysis and archiving of the data, the SeisComP3 software was used, which was developed by the GEOFON project in Helmholtz Centre Potsdam in GFZ German Research Centre for Geosciences and Gempa GmbH. The software was installed on an independent server and the huge amounts of data, which are obtained by the local network, are stored on special disk arrays.

The SeisComP3 software performs, after appropriate parameterization, automatic picking of seismic phases for the recorded seismic waves (Fig 14) and makes an initial automatic determination of the local earthquakes.

In the figure below, we can see an example of the analysis and the re-evaluated solution of the ML4.7 earthquake of 22/03/2024 05:41 GMT in the region of the Ionian Sea, within the area of interest as recorded of the local network and the automatic system. It can be seen that the waveforms recorded by all stations of the local network were perfectly clear.

An SMS paging system was also built, with automatic alerts, with the automatic solutions for important earthquakes that are sent to the relevant scientists of G.I. and HELLENiQ UPSTREAM IONIO S.A. within 1-3 minutes.

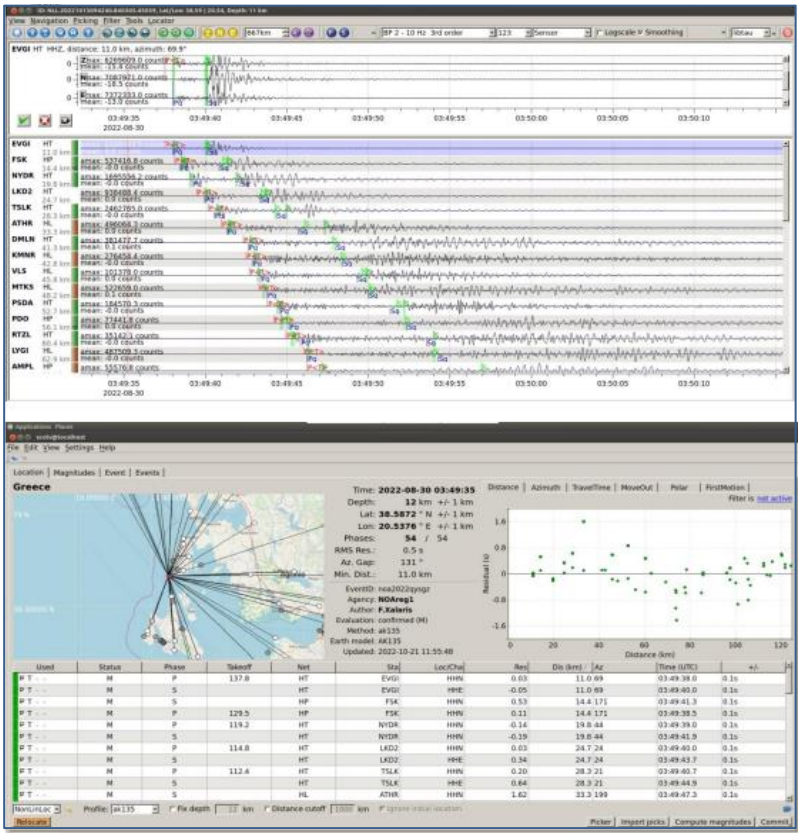

Figure 14: Example of automatic analysis and epicentral location. The M4.7 earthquake that occurred on the 22nd of March 2024 at 05:20:41 GMT, as recorded by the stations of the local network and the automatic system.

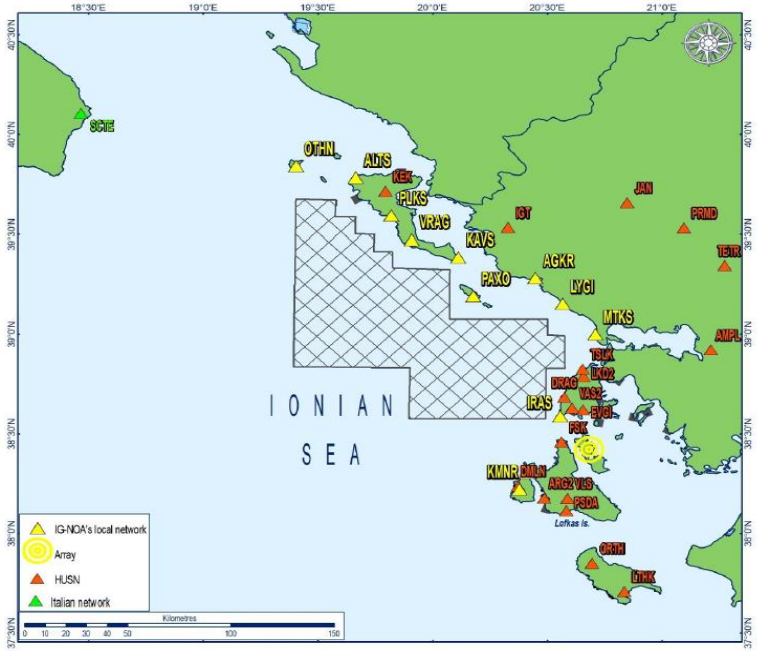


Figure 15: The locations of the stations of the local network (in yellow) that were installed as part of the project, as well as the permanent stations that are currently in operation in the broader area (in red)

The portable stations of the Institute of Geodynamics are shown in yellow color. A detailed description per installation site, have been provided to HELLENiQ UPSTREAM Ionian S.A. in Deliverable A: Report: Portable local network installation – Maintenance of existing stations in the concession area "IONIO" (June 2023).

### *3.4. Recorded seismicity from the local network*

Although the installation and operation of the local network started on May 2022, it was completed at the end of July 2022 and therefore seismicity monitoring under the same conditions practically started from August 2022.

From the start of the recording period up to the end of May 2024, a total number of 8501 earthquakes were recorded, with the majority of them being concentrated in the Cephalonia transform fault zone, as well as the broader region of Parga (Figure 17). It should be noted that for all the above seismic events, their hypocenters were recalculated based on an optimal minimum 1D velocity model which was calculated for the broader region. This model was derived after 1D inversion of the obtained travel-times from the best identified events. Details of the process are presented in the final 1st year report (Report on the first year of monitoring – results - suggestions). During the same period NOA recorded a significantly lower number of earthquakes (3733 events) for the same region, i.e. equal to approximately 44% of the ones identified by the local network.

Of all the seismic events, 3722 were recording during the first year of monitoring between May 2022 – May 2023 and 4665 during the second year, between June 2023 – May 2024 (Figure 16). The distribution of seismicity during the second year (Figure 17) shows a noteworthy activity south of Othoni. It is related to the aftershock sequence of the MW4.5 earthquake (calculated at ML4.7 by the local network). The main event occurred on the 22nd of March 2024 and its associated focal mechanism showed normal faulting. The fault that was activated appears to have a NW-SE trend and a NE dip. The fault length did not exceed 35 km on the horizontal plane. From a geodynamic perspective this region is located to the west of the collision front between the Aegean and the Apulian continental plates with the former being thrusted over the latter. This activity took place on the upper Apulian crust.

More than 120 events were recorded in this sequence while at the same time the national network recorded less than half of these. The events with magnitudes larger or equal to M3.0 are shown in Figure 18 . The strongest earthquakes are arranged on a pattern compatible with the main axis of the focal mechanism of the stronger earthquake.

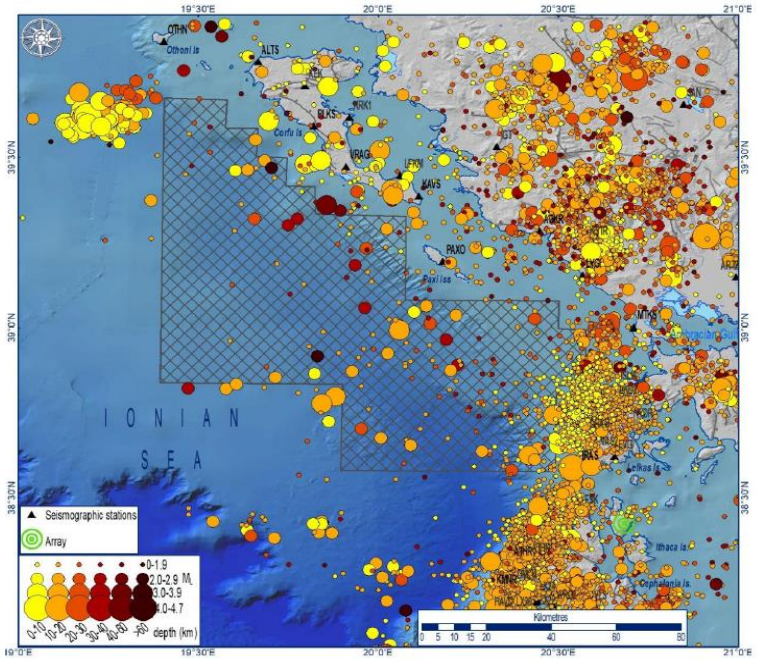


Figure 16: Recorded seismicity for the period between June 2022 - May 2024

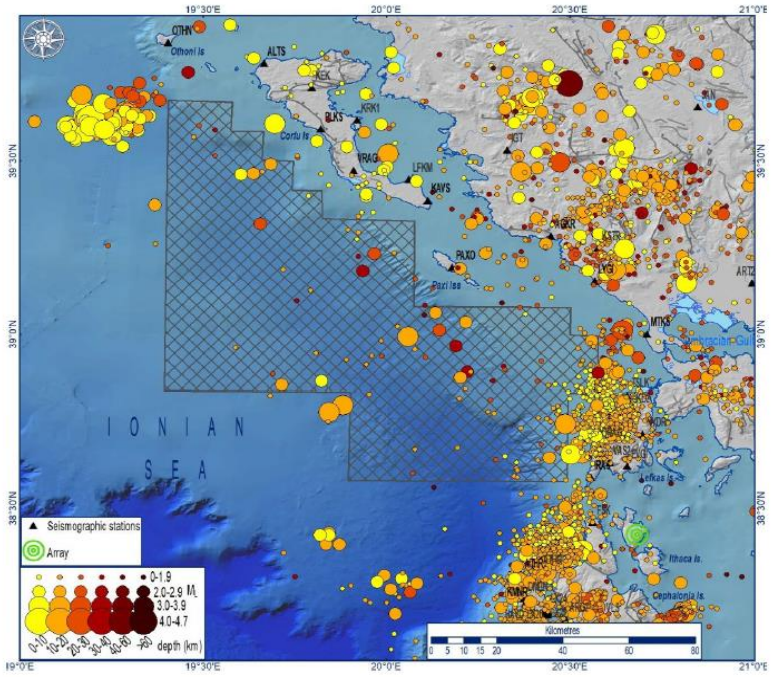


Figure 17: Recorded seismicity during the second monitoring period between June 2023 – May 2024.

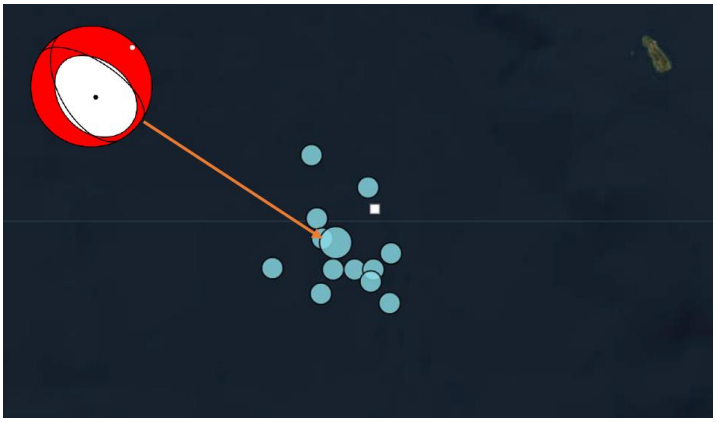

Figure 16: The M4.7 earthquake in Othoni was followed by 12 earthquakes with magnitudes larger than or equal to M3.0.

The greatly increased number of events recorded by the local network compared to the national network shows the high seismicity monitoring capabilities that were achieved. A more general estimate of the total seismicity of the area with the local network shows that the magnitude of completeness in the broader area improves by about half a degree on the Richter scale (Figure 19). However, the area also includes the Cephalonia transform fault which is adequately covered by the national network. More specifically, for the area of interest, the very limited seismicity makes it particularly difficult to determine the magnitude of completeness. Based on the enriched catalogue obtained during the present monitoring phase, it is possible to make an initial estimate of the magnitude of completeness at MC1.2.

Throughout the whole monitoring period, the study area shows evidence of very low seismicity with a very small number of events and with small magnitudes. The only noteworthy event is the ML4.7 earthquake in the Othoni region that occurred on the 22nd of March 2024.

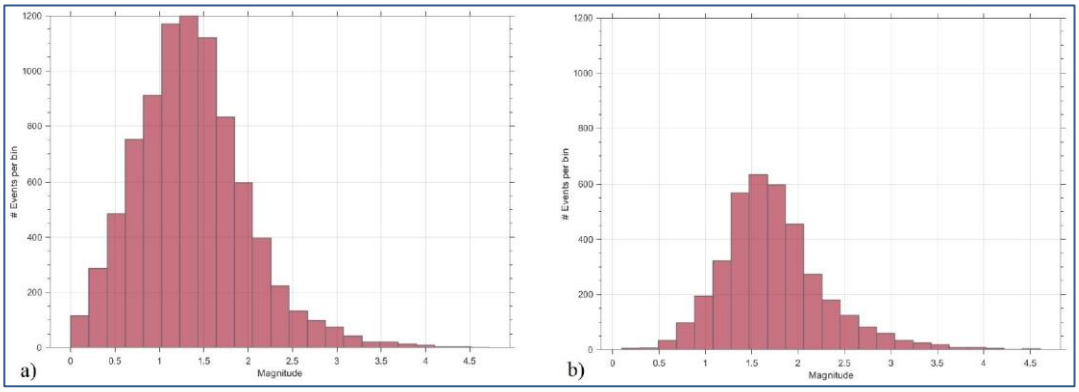


Figure 17: Magnitude distribution histogram for the seismic events that were analyzed by the local network b) by the routine daily analysis of NOA.

### 3.4.1. Conclusions

During the time of operation of the local seismographic network and until 31/05/2024, the microseismic monitoring was carried out smoothly, without technical problems, recording about 4 thousand earthquakes in total in the broader study area. Even though, within the narrow area of interest and specifically within the Block Ionian area no significant seismicity is observed, a magnitude M4.7 earthquake occurred on the NW margin of the region. The zone that was activated is possibly the same hat gave the M5.5 and M5.7 earthquakes in 1919 and 1920 respectively. The accuracy of the calculations at that time was not satisfactory, however by combining the regional tectonics with the recorded seismicity this relation seems possible. Even the magnitudes from these events from the previous century do not have the required accuracy in order to draw safe conclusions. In general, this particular region is characterized by particularly low seismicity without significant active zones.
Towards the neighboring Lefkada region, marginally at the Cephalonia-Lefkada transform fault seismicity is recorded, but it is only locally related to this region.

## 4. Seismicity Monitoring & Seismic Hazard Assessment – 2025 onwards

The collaboration with the Institute of Geodynamics of NOA in the context of the Program "Seismicity Monitoring & Seismic Hazard Assessment in the Lease Area of Block Ionian will continue in 2025 and the relevant tasks will include the following:

- Maintenance of 12 portable seismographs in addition to the permanent national network and a seismic array of 6 portable seismographs.
- Data transmission in real-time and a daily basis analysis.
- Development of a 3D tomographic model.
- Automatic notifications SMS to "HELLENiQ UPSTREAM IONIAN" based on the automatic solutions for earthquakes in the area with size from (≥M4.0).
- Seismic Hazard assessment Study in the wider area of the "Block Ionian".